Course Overview

**Title :                    Mathematical methods**

**Duration :**             24 hours

**Professor :**           Paul Dubois

**Email :**           [b00795695@essec.edu](mailto:b00795695@essec.edu)

**Website :**           <https://github.com/pauldubois98/RefresherMaths2024>

**Course description / summary**

This course teaches basic mathematical methodologies for data science. It is intended for students with a lack of mathematical background, or with a lack of confidence in mathematics. We will try to cover most of the prerequisites of the courses in the Master, mainly linear algebra, differential calculus, integration, and optimization.

**Structure**

Each session of the course consists in 3 hours: class (notes written on the board) and exercises to assimilate the methodologies and notions covered in class. Computers with Python installed are required for some of the exercises.

**Content (table of contents)**

The table of contents may change according to student’s needs.

* Combinatorics
* Calculus
* Optimization
* Linear Algebra
* Differential Equations
* Principal Component Analysis
* Binary Classification

**Learning objectives**

- gain confidence in mathematics

- use numerical experiments for a better understanding of mathematical concepts.

**Prerequisites**

High school mathematics.

**Reading material**

On the website (<https://github.com/pauldubois98/RefresherMaths2024>) you will be able to find the notes for the class, and the exercises.

If you want to go (much) further than this course in terms of mathematics, I suggest reading “Real and Complex Analysis” (Walter Rudin).

**Evaluation**

The grade is binary : pass or fail.

In order to pass the course, you need to validate each session.

Validating a session can be done either by *coming in person to the session*, or by successfully *solving all compulsory questions* from the corresponding problem set.